●CLAIMS

[Claim 1] An EPIR device of a structure in which a lower electrode layer, a CMR material thin film layer and an upper electrode layer are laminated in this order, characterized in that:

said lower metal electrode layer is made of a metal material whose principal component is comprised of a noble metal singly or an alloy thereof, a large part of said lower metal electrode layer being oriented to a (1 1 1) face, and

a large part of crystal grains of said CMR material thin film layer is locally grown epitaxially on metal crystal grains of said lower metal electrode layer whose outermost surfaces are said (1 1 1) face.

[Claim 2] An EPIR device of a structure in which a lower electrode layer, a CMR material thin film layer and an upper electrode layer are laminated in this order, characterized in that:

said lower electrode layer is made of a metal material whose principal component is comprised of a noble metal singly or an alloy thereof,

a large part of crystal grains of said CMR material thin film layer is locally grown epitaxially on crystal grains of said lower metal electrode layer, and

said epitaxially grown crystal grain groups of said CMR material thin film layer have crystal faces vertical in a substrate surface normal direction and corresponding to one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 3] An EPIR device of a structure in which a lower electrode layer, a CMR material thin film layer and an upper electrode layer are laminated in this order, characterized in that:

said lower electrode layer is made of a metal material whose principal component is a noble metal singly or an alloy thereof, a large part of said lower electrode layer being oriented to a (1 1 1) face, and

a large part of crystal grains of said CMR material thin film layer are locally grown epitaxially on metal crystal grains of said lower metal electrode layer, the outermost surface of each said metal crystal grains corresponding to said (1 1 1) face, said epitaxially grown crystal grain groups of said CMR material

thin film layer having crystal faces vertical in a substrate surface normal direction and corresponding to one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 4] An EPIR device as set forth in claim 1, characterized in that said lower electrode layer is made of a metal material whose principal component is comprised of a platinum class metal singly or an alloy thereof.

[Claim 5] An EPIR device as set forth in claim 1, characterized in that said lower electrode layer is made of platinum.

[Claim 6] An EPIR device as set forth in claim 1, characterized in that when forming said EPIR device on said substrate, a barrier layer is formed between said substrate and said lower electrode layer to prevent the occurrence of reaction therebetween.

[Claim 7] An EPIR device as set forth in claim 1, characterized in that the arrangement of the crystal orientations of said lower metal electrode layer in the substrate surface normal direction is such that over 60 % thereof is oriented to said (1 1 1) face.

[Claim 8] An EPIR device as set forth in claim 1, characterized in that the arrangement of the crystal orientations of said lower metal electrode layer in said substrate surface normal direction is such that over 90 % thereof is oriented to said (1 1 1) face.

[Claim 9] An EPIR device as set forth in claim 1, characterized in that over 60 % of the crystal grains of said CMR material thin film layer is locally grown epitaxially on the metal crystal grains of said lower metal electrode layer whose outermost surfaces are said (1 1 1) face to which the crystal orientations of said lower metal electrode layer in said substrate surface normal direction are directed, and that said over 60 % of the crystal grains of said CMR material thin film layer is oriented to any one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 10] An EPIR device as set forth in claim 1, characterized in that over 80 % of the crystal grains of said CMR material thin film layer is locally grown epitaxially on the metal crystal grains of said lower metal electrode layer

whose outermost surfaces are said (1 1 1) face to which the crystal orientations of said lower metal electrode layer in the substrate surface normal direction are directed, and that said over 80 % of the crystal grains of said CMR material thin film layer is oriented to any one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 11] A semiconductor device characterized in that said semiconductor device comprises at least one of said EPIR device set forth in claim 1.

[Claim 12] An EPIR device as set forth in claim 2, characterized in that said lower electrode layer is made of a metal material whose principal component is comprised of a platinum class metal singly or an alloy thereof.

[Claim 13] An EPIR device as set forth in claim 2, characterized in that said lower electrode layer is made of platinum.

[Claim 14] An EPIR device as set forth in claim 2, characterized in that when forming said EPIR device on said substrate, a barrier layer is formed between said substrate and said lower electrode layer to prevent the occurrence of reaction therebetween.

[Claim 15] An EPIR device as set forth in claim 2, characterized in that the arrangement of the crystal orientations of said lower metal electrode layer in the substrate surface normal direction is such that over 60 % thereof is oriented to said (1 1 1) face.

[Claim 16] An EPIR device as set forth in claim 2, characterized in that the arrangement of the crystal orientations of said lower metal electrode layer in said substrate surface normal direction is such that over 90 % thereof is oriented to said (1 1 1) face.

[Claim 17] An EPIR device as set forth in claim 2, characterized in that over 60 % of the crystal grains of said CMR material thin film layer is locally grown epitaxially on the metal crystal grains of said lower metal electrode layer whose outermost surfaces are said (1 1 1) face to which the crystal orientations of said lower metal electrode layer in said substrate surface normal direction are directed, and that said over 60 % of the crystal grains of

said CMR material thin film layer is oriented to any one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 18] An EPIR device as set forth in claim 2, characterized in that over 80 % of the crystal grains of said CMR material thin film layer is locally grown epitaxially on the metal crystal grains of said lower metal electrode layer whose outermost surfaces are said (1 1 1) face to which the crystal orientations of said lower metal electrode layer in the substrate surface normal direction are directed, and that said over 80 % of the crystal grains of said CMR material thin film layer is oriented to any one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 19] A semiconductor device characterized in that said semiconductor device comprises at least one of said EPIR device set forth in claim 2.

[Claim 20] An EPIR device as set forth in claim 3, characterized in that said lower electrode layer is made of a metal material whose principal component is comprised of a platinum class metal singly or an alloy thereof.

[Claim 21] An EPIR device as set forth in claim 3, characterized in that said lower electrode layer is made of platinum.

[Claim 22] An EPIR device as set forth in claim 3, characterized in that when forming said EPIR device on said substrate, a barrier layer is formed between said substrate and said lower electrode layer to prevent the occurrence of reaction therebetween.

[Claim 23] An EPIR device as set forth in claim 3, characterized in that the arrangement of the crystal orientations of said lower metal electrode layer in the substrate surface normal direction is such that over 60 % thereof is oriented to said (1 1 1) face.

[Claim 24] An EPIR device as set forth in claim 3, characterized in that the arrangement of the crystal orientations of said lower metal electrode layer in said substrate surface normal direction is such that over 90 % thereof is oriented to said (1 1 1) face.

[Claim 25] An EPIR device as set forth in claim 3, characterized in that over

60 % of the crystal grains of said CMR material thin film layer is locally grown epitaxially on the metal crystal grains of said lower metal electrode layer whose outermost surfaces are said (1 1 1) face to which the crystal orientations of said lower metal electrode layer in said substrate surface normal direction are directed, and that said over 60 % of the crystal grains of said CMR material thin film layer is oriented to any one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 26] An EPIR device as set forth in claim 3, characterized in that over 80 % of the crystal grains of said CMR material thin film layer is locally grown epitaxially on the metal crystal grains of said lower metal electrode layer whose outermost surfaces are said (1 1 1) face to which the crystal orientations of said lower metal electrode layer in the substrate surface normal direction are directed, and that said over 80 % of the crystal grains of said CMR material thin film layer is oriented to any one of $(1\ 0\ 0)_p$, $(1\ 1\ 0)_p$ and $(1\ 1\ 1)_p$ planes.

[Claim 27] A semiconductor device characterized in that said semiconductor device comprises at least one of said EPIR device set forth in claim 3.